Nanotechnology Research, Education, and Outreach by the Integrated Nanosystems Development Institute (INDI)

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Abstract:

Through multidisciplinary research and novel educational programing, the Integrated Nanosystems Development Institute (INDI) is sponsored under IUPUI's Signature Center Initiative to advance nanotechnology-based systems research and spark student interest in this emerging STEM field. Innovation in the field of nanotechnology arises from interdisciplinary approaches and INDI draws on the expertise of faculty across departments and schools (including the School of Engineering and Technology, School of Science, School of Dentistry, and School of Medicine) in order to fuel research collaborations and offer nanosystems coursework to both science and engineering students. Current research efforts are focused in INDI's thrust areas of bionanotechnology and sustainable nanoenergy, which build on the existing strengths of participating schools and span a range of critical issues in nanomaterials, nanodevices, nanosystems, energy, physics, and nanomedicine. Examples of research include the development of artificial biomaterials, toxicology of nanomaterials, and the development of nanomanufacturing techniques and educational tools. INDI facilitates research efforts by identifying funding opportunities, establishing research teams, offering seed funding, and providing a cluster of analytical equipment, characterization tools, and lab resources that support the work of faculty and student researchers. Aside from research, INDI plays a vital role in nanotechnology curriculum development on campus, in particular, the design and implementation of coursework offered within IUPUI's newly developed Nanotechnology Track and Energy Engineering degree program. This academic track provides students with both theory and hands-on experiences involving the fabrication, characterization, and applications of nanomaterials, nanodevices and nanomedicine. Moreover, INDI's community outreach activities, including its nanotechnology summer camps for K-12 students and teachers, aim to provide early student exposure and educate teachers in applying nanotechnology modules within their classrooms. These student experiences are designed to encourage higher education in an effort to generate the advanced nanotechnology workforce needed by Indiana and the nation.